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contiguous through the first flexible member, second flexible member and connecting region.

24. A flexural pivot device of claim 21, wherein the first flexible member is affixed to the stationary member by a spot welding method selected from the group consisting of resistance, laser, ultrasonic, and radio-frequency.
25. A flexural pivot device of claim 22, wherein the first flexible member is formed integral with the stationary member.
26. A flexural pivot device of claim 22, wherein the first flexible member is formed integral with the rotate-able member.

Abstract: Replace with the following:

An improved flexural pivot design simplifies the structure, fabrication, assembly, and integration into a device. The flexural members are preloaded into curved forms and share a common tangency on either the stationary or rotate-able portion. The flexures follow opposing centers of curvature to provide a stable center of rotation and allow repeatable limited-angle rotational motion. The flexural members may be formed in a unitary planar structure.

REMARKS – General

By the above amendment, Applicant has amended the title to emphasize the novelty of the invention.

Also, Applicant has re-written all claims to define the invention more particularly and distinctly so as to overcome the technical objections and define the invention patentably over the prior art.

The abstract has been similarly amended to more clearly state the advantages of the invention of all prior art references.

The Novel Physical Features of Claims 15-26 Are Unobvious And Patentable Over Wheeler Under § 102(b)

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Prior to discussing the amended claims 15-26, Applicant will first discuss the reference and the general novelty of the present invention and its unobviousness over the reference.

Wheeler is entitled a "Cross-Spring Flexure Pivot". Wheeler describes a flexural pivot with two or more flexible members which cross one-another in a symmetrical "X" configuration and form a line of intersection. Wheeler, col. 2, ll. 37-43. Applicant specifies flexible members which do not cross, nor do the flexible members exhibit a line of intersection. Further, Wheeler clearly terminates the 2 flexible members to 2 different locations on both the stationary and rotate-able portions of the flexural pivot. Wheeler, col.2, ll. 28-38. Applicant specifies flexible members which terminate on two surfaces of the stationary member and a single surface on the rotate-able member. Hence, Applicant specifies flexible members which exhibit a line of tangency as the flexible members converge on the single surface of the rotate-able member.

Wheeler specifies a unitary and planar flexible member, but the planar member possesses substantially 90 degree bends at 4 locations and substantially 45 degree bends at 4 other locations. Applicant specifies flexible members which are unitary and substantially flat, prior to being preloaded into curved forms. Applicant specification eliminates this bending operation, the residual material stresses inherent to bending and allowing the material used for the stationary and rotate-able structure to be optimized separate from the flexible material.

The Rejection of Claims 1, 3, 5-7, 9 and 11-12 On Wheeler Are Overcome

The last O.A. rejected claims 1, 3, 5-7, 9 and 11-12 as being anticipated by Wheeler.

Claims 1 and 7 have been rewritten as claims 15 and 21 to define patentably over this reference. Claim 15 clearly recites that both flexible members mount to a single surface on the rotate-able member. Further, claim 15 recites flexible members which are affixed tangent to the surfaces of both the stationary and rotate-able members. Similarly, Claim 21 recites that both flexible members mount to a single surface on the stationary member and are affixed tangent to the surfaces.

Therefore, Applicant submits that claims 15 and 21 are allowable over the cited reference and solicits reconsideration and allowance.

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Claims 3 and 9 have been rewritten as claims 17 and 23 to define patentably over this reference. Claims 17 and 23 clearly recite a substantially planar form which is contiguous through both first and second flexible members.

Therefore, Applicant submits that claims 17 and 23 are allowable over the cited reference and solicits reconsideration and allowance.

Claims 5-6 and 11-12 have been rewritten as claims 19-20 and 25-26 to define patentably over this reference. Claims 19-20 are dependent claims of claim 16 which recites flexible members that are made of ceramics, semiconductors, or plastic resins. Similarly claims 25-26 are dependent claims of claim 22 which also recites flexible members that are made of ceramics, semiconductors, or plastic resins.

Therefore, Applicant submits that claims 19-20 and 25-26 are allowable over the cited reference and solicits reconsideration and allowance.

Applicant requests reconsideration of patentably under § 102(b), as now applicable to claims 15-26, for the following reasons:

- (1) The novel features of claims 15-26 utilize a new principle of operation over the prior art reference. The flexible members share a common tangency and do not cross, as noted in the cited reference.
- (2) The novel features of claims 15-26 solves a problem which was not recognized by the prior art reference. The substantially flat flexible members are more amenable to the current manufacturing processes, such as those used in the semiconductor industry. The cited reference relies upon stamping and forming processes.
- (3) The novel features of claims 15-26 produce new and unexpected results and hence are unobvious and patentable over this reference. The preloaded curved flexible members provide a stable rotational axis without crossing, as required in the cited reference.
- (4) The reference contains no suggestion that the prior art could be modified in a manner to meet the claims 15-26. The flexible members share a common tangency and do not cross, as noted in the cited reference.
- (5) The novel features of claims 15-26 are a small step forward for the crowded art of this classification. Many flexural pivot inventions exist; Applicant's invention aligns flexural

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pivot designs with contemporary products, such as MEMS and contemporary manufacturing processes, such as those used in the semiconductor industry.

- (5) The novel features of claims 15-26 are a small step forward for the crowded art of this classification.

The Rejection of Claims 2 and 8 On Wheeler and Brooks Are Overcome

The last O.A. rejected claims 2 and 8 as unpatentable over Wheeler in view of Brooks. Wheeler recites 1095 carbon steel (col. 3, l. 14). Brooks recites 17-4 PH stainless steel (col. 3, l. 1). Claims 2 and 8 have been rewritten as claims 16 and 22 to define patentably over this reference. Claims 16 and 22 recite the use of ceramics, semiconductors and plastic resins for the flexible members.

Therefore, Applicant submits that claims 16 and 22 are allowable over the cited reference and solicits reconsideration and allowance.

The Rejection of Claims 4 and 10 On Wheeler and Lewis Are Overcome

The last O.A. rejected claims 4 and 10 as unpatentable over Wheeler in view of Lewis. Wheeler references no welding method, since the flexible members are unitary to the structural members and delineated by bends in the flexible material. Wheeler notes mounting holes (col. 3, ll. 60-63) in the structural portions of the flexible member to be used for mounting to the stationary and moveable bodies (col. 3, ll. 66-69). Lewis recites brazing, bonding and welding (col. 3, ll. 8-15). Claims 4 and 10 have been rewritten as claims 18 and 24 to define patentably over this reference. Claims 18 and 24 recite the use of a spot welding by methods using resistance, laser, ultrasonic, and radio-frequency.

Therefore, Applicant submits that claims 18 and 24 are allowable over the cited reference and solicits reconsideration and allowance.

The Rejection of Claims 13-14 On Wheeler and He et al Is Noted

The last O.A. rejected claims 13-14 as unpatentable over Wheeler in view of He et al. Wheeler recited a pair of flexible members (col. 4, ll. 38-39). He et al cites a plurality of flexible members (pp. 0024). Claims 13-14 have been deleted.

Amended Claims Are Patentable Over Non-Applied References

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Paulsen recites a scanner utilizing flexible members made of spring steel. Applicant submits that the novel physical features of claims 15-26 are patentable over Paulsen.

McKillip and Bilanin et al both recite a flexible member with multiple stable positions for use as an actuator for aerodynamic or hydrodynamic control surfaces. Applicant submits that the novel physical features of claims 15-26 are patentable over both McKillip and Bilanin et al.

Howell et al recites a method for designing a compliant mechanism. Applicant submits that the novel physical features of claims 15-26 are patentable over Howell et al.

Federn recites a linkage utilizing flexible cross members which form a line of intersection, similar to Wheeler. Applicant submits that the novel physical features of claims 15-26 are patentable over Federn.

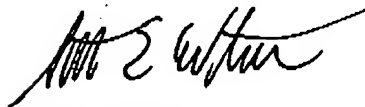
Conclusion

For all the above reasons, Applicant submits that the claims all define patentably over the prior art. Therefore Applicant submits that this application is now in condition for allowance, which action he respectfully solicits.

Conditional Request For Constructive Assistance

Applicant has amended the claims of this application so that they are proper, definite, and define novel structure which is also unobvious. If, for any reason this application is not believed to be in full condition for allowance, Applicant respectfully requests the constructive assistance and suggestions of the Examiner pursuant to M.P.E.P. § 2173.02 and § 707.07(j) in order that the undersigned can place this application in allowable condition as soon as possible and without the need for further proceedings.

Very respectfully,



Scott Watson

4841 Winton Way

San Jose, California 95124

Cell: (408) 375-9021

Home: (408) 358-6480

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Certificate of Facsimile Transmission

I certify that on the date below I will fax this communication, and attachments if any, to Group 3683 of the Patent and Trademark Office at the following number (703) 872-9306.

Date: September 19, 2005

Inventor's Signature: 

Attachment: **Appendix to Amendment A With Replacement Paragraphs
Marked-Up to Indicate Changes**